January 24, 2014

Mr. Sean Sheldrake
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Seattle, Washington 98101

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Subject: Dispute of EPA Comments, Arkema Inc. Portland Facility
Administrative Order on Consent (AOC) for Removal Action
U.S. EPA Region 10 Docket No. CERCLA 10-2005-0191

Dear Mr. Sheldrake and Ms. Cora:

Legacy Site Services LLC (LSS), agent for Arkema Inc. (Arkema), invokes the dispute resolution process pursuant to section XVI, paragraph 49 of the Administrative Order on Consent for Removal Action (AOC) entered into by Arkema Inc. and the U.S. Environmental Protection Agency (EPA) with an effective date of June 27, 2005. Specifically, LSS disputes the following issues/comments referenced in EPA's January 10, 2014 letter to LSS:

- EE/CA Costing Detail (Comments 14, 15, 16, 18, 33, 34)
- Waste Designation (Comment 20)
- Monitored Natural Recovery and Nonaqueous-Phase Liquids (Comments 26, 37, 38, 39, 40, 43, 44, 45, 46, 47)
- Other Sources of COIs (Comments 61, 92, 93, 94, 95, 96, 97, 98)
- Capping as the Primary Remedial Approach (Comments 73, 101, 103)
- Remedy Implementation and Monitoring (Comments 106, 107, 108, 109, 111, 112)
- Process for Disputing Agreements Reached between LWG and EPA on Harbor-Wide Issues (i.e., "place-holder comments").

I. INTRODUCTION

LSS submitted the draft engineering evaluation and cost analysis (EE/CA) report to EPA on July 26, 2012 and received comments from EPA on the draft report on February 11, 2013. The comments were broken into two groups, harbor-wide comments (8 "place-holder" comments) and Arkema-specific comments (104 comments). The harbor-wide place-holder comments were provided to LSS for reference with the understanding that they will be resolved to a certain

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extent through the Portland Harbor process. LSS is not disputing the harbor-wide place-holder comments at this time because, as EPA acknowledges, the issues are not ripe; however, LSS does not agree with EPA's position that it must use its dispute rights under the Portland Harbor AOC and forego its dispute rights under the Removal Action AOC for issues being decided through the Portland Harbor process that may be applied to, or otherwise affect, the Arkema removal action at a later date. The right to dispute any of these place-holder comments is triggered by EPA's application to the Arkema removal action, separate and apart from the Portland Harbor process, as discussed further in the dispute item entitled "Agreements Reached between LWG and EPA on Harbor-Wide Issues" below. LSS responded to the Arkema-specific comments on March 28, 2013, and EPA provided a response to LSS' comment response letter on September 18, 2013.

LSS and EPA had a productive meeting and conference call to discuss the EE/CA comments on November 14 and December 12, 2013, respectively. As a result of these discussions and previous negotiations, LSS and EPA currently have agreements on the path forward to address the majority of the EPA comments on the draft EE/CA report. In addition, during those discussions LSS and EPA agreed that Comments 53, 55, 57, 58, and 80 would be moved to the place-holder category since they will be initially addressed through the harbor-wide feasibility study process. LSS submitted letters to EPA on November 22 and December 18, 2013 summarizing the agreements reached between LSS and EPA representatives during the November 14 and December 12, 2013 discussions, respectively. EPA submitted letters to LSS on December 12, 2013 and January 10, 2014 responding to the LSS agreement summary letters.

A brief chronological description of key documents related to the issues raised in this dispute is presented below:

- July 26, 2012: LSS submitted the draft EE/CA report to EPA (Exhibit 1; Integral 2012)
- February 11, 2013: EPA submitted a letter to LSS providing comments on the draft EE/CA report (Exhibit 2; EPA 2013a)
- March 28, 2013: LSS submitted a letter to EPA responding to comments in EPA's February 11, 2013 letter (Exhibit 3; LSS 2013a)
- September 18, 2013: EPA submitted a letter responding to LSS' response to EPA's March 28, 2013 comment letter (Exhibit 4; EPA 2013b)
- November 22, 2013: LSS submitted a letter to EPA summarizing the agreements reached during the November 14, 2013 meeting with EPA representatives (Exhibit 5; LSS 2013b)
- December 12, 2013: LSS received a letter from EPA on December 12, 2013 responding to LSS' November 22, 2013 letter that summarized the agreements reached during the November 14, 2013 meeting with EPA representatives (Exhibit 6; EPA 2013c)
- December 18, 2013: LSS submitted a letter to EPA summarizing the agreements reached during the December 12, 2013 call with EPA representatives (Exhibit 7; LSS 2013c)

- January 10, 2014: EPA submitted a letter to LSS responding to LSS' November 22 and December 12, 2013 letters and summarizing the status of the agreements reached between LSS and EPA on the comments (Exhibit 8; EPA 2014).

The following section summarizes the seven disputed issues and provides LSS' position on dispute. References cited in this letter are presented in Attachment 1.

II. DISPUTED ISSUES/COMMENTS

The following sections present information on the disputed comments/comment groups.

A. EE/CA Costing Detail

LSS disputes the EE/CA costing detail presented in Comments 14, 15, 16, 18, 33, and 34. The issue is summarized and LSS' dispute position is presented in the following sections.

1. Background and Summary

The following section is excerpted from EPA's January 10, 2014 letter (Exhibit 8; EPA 2014).

> Comments 14, 15, 16, 18, 33, and 34 – Alternative Costing Detail
> These comments were discussed in the November 14th meeting. LSS provided the following summary in their November 22nd letter:
>
> *EPA noted that the EE/CA cost estimate should provide a level of detail sufficient to facilitate selection of the preferred alternative and incorporation into the harbor-wide FS ROD.* ***LSS agreed it would provide more detail in the form of a brief narrative summarizing key assumptions for each major cost component. LSS proposed to revise the draft cost estimate to provide a level of detail equivalent to Appendix A of the Final 2008 Engineering Evaluation/Cost Analysis for the Lower Passaic River (LPR) Phase I Removal Action.*** *EPA agreed to review the cost estimate for the LPR Phase I Removal Action and provide feedback to LSS. LSS provided the LPR document to CDM Smith on November 21, 2013. (****emphasis added****)*
>
> **EPA Response:**
> EPA previously provided Comments 14, 15, 16, 18, 33, and 34 on July 26, 2012. LSS responded to those comments by stating they may incorporate additional cost backup information and consider other possible revisions to the overall presentation and evaluation of costs, including those requested by EPA, provided the revisions are relevant and appropriate to an EE/CA level evaluation.
>
> EPA has previously stated that cost estimates for alternatives evaluated within the Arkema EE/CA should be developed following EPA's FS cost estimating guidance1. EPA's intent for adherence to this guidance is that the EE/CA will supplement the harbor-wide FS and thus will help facilitate a quicker response action post-Record of Decision (ROD). EPA has reviewed Appendix A of the Final 2008 EE/CA for the Lower Passaic River Phase I Removal Action (LPR cost estimate) that LSS provided. The LPR Phase I EE/CA states that the cost

estimates were generally prepared in accordance with EPA regulatory guidance, including EPA's removal action guidance and EPA's FS cost estimating guidance.

Upon specific review, it appears the LPR cost estimate as a template for the Arkema EE/CA does not meet the original intent conveyed in the EPA costing comments, including those concerning EPA's FS cost estimating guidance. Specifically, as indicated in EPA Comment 14, Exhibit 5-13 of EPA's FS cost estimating guidance (EPA 540-R-00-002) should be used by LSS to review the revised Arkema EE/CA cost estimate for completeness. EPA's position is that the EE/CA cost estimates for Arkema need to be sufficiently developed in accordance with this guidance to facilitate evaluation and potential selection of the preferred alternative in the ROD and to allow integration and comparison with estimates developed for the Harbor-wide FS.

The LPR cost estimate did not address all cost estimate issues that is considered necessary for the Arkema EE/CA. EPA has prepared and attached a table to this letter (Attachment A) that indicates the general comparison of this proposed template to the requirements indicated in Exhibit 5-13 of EPA 540-R-00-002.

Although EPA's position as presented in the comments is that the cost estimate in the draft EE/CA should follow the cost estimate guidance presented in EPA 540-R-00-002, some specific issues with the template provided versus what is needed for the Arkema EE/CA include but are not limited to:

- Transparency and documentation of assumptions and calculations such as quantity takeoffs and sources of cost information (Comments 18 and 33)
- Lack of a present value analysis, periodic costs (Comment 16), long-term monitoring costs (Comment 34), and operation and maintenance (O&M) costs (Comments 15 and 34)
- Lack of detailed cost back-up (Comment 18)

LSS must modify the draft EE/CA to address all of EPA's comments on the cost estimate.

2. LSS Dispute Position

LSS disputes EPA's response on costing detail. LSS believes that the LPR Phase I EE/CA (with site-specific modifications) is an appropriate model for use in providing the detailed accounting and backup for the revised Arkema EE/CA cost estimate. Furthermore, the LPR Phase I EE/CA was completed after EPA's FS Costing Guidance was published and was approved by EPA Region 2.

EPA provided the six comments listed above regarding the level of detail included in the EE/CA cost estimate. LSS responded that it will include more costing detail in the revised EE/CA. LSS also provided an explanation of the level of costing detail to be included, and LSS even presented a document for a similar project, *Final 2008 EE/CA for the Lower Passaic River Phase I Removal Action* (LPR Phase I EE/CA; Exhibit 9; Tierra Solutions 2008), as an example of the type and level of detail that would be included in the revised Arkema EE/CA, with site-specific modifications.

As noted in EPA's response above, EPA subsequently rejected the example provided, stating that it did not meet certain requirements as provided in Exhibit 5-13 of EPA's *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study* (FS Costing Guidance; Exhibit 10; EPA and USACE 2000). In addition, EPA reemphasized that LSS must provide a level of costing detail that includes transparency and documentation of assumptions and calculations (Comments 18 and 33), a present value analysis, and periodic costs (Comment 16), long-term monitoring costs (Comment 34), and operation and maintenance (O&M) costs (Comments 15 and 34), as well as a detailed cost back-up (Comment 18).

LSS disputes EPA's response. LSS has already agreed that it will provide additional costing detail like that provided in an EE/CA of similar scope and magnitude, with site-specific modifications. LSS also agrees with the use of Exhibit 5-13 of EPA's FS Costing Guidance as a roadmap for determining the level of costing detail to be provided in the revised EE/CA. However, EPA has rejected the LPR Phase I EE/CA example as an appropriate level of costing detail, even though this EE/CA was recently accepted and approved by EPA Region 2. LSS disagrees with EPA's assessment that the LPR Phase I EE/CA does not substantively meet the Exhibit 5-13 requirements (as summarized by EPA in Attachment A to the January 10, 2014 letter). More specifically, LSS disagrees with EPA's determination that the example document does not meet EPA's requirements of providing transparency and documentation of assumptions and calculations, O&M costs, and detailed cost back-up. The example document does not include present value analysis, periodic costs, and long-term monitoring costs because they were not specifically applicable to that project. These items will be provided in the revised Arkema EE/CA, as applicable.

Specific examples of where EPA has made an incorrect determination that the LPR Phase I EE/CA document does not "meet the basic requirements as a template for [the] Arkema EE/CA" include, but are not limited to, the 17 items presented in Attachment 2. In order to resolve these issues, LSS proposals for providing cost detail are also provided in Attachment 2.

B. Oregon Pesticide Rule and Waste Designation

LSS disputes Comment 20 related to the Oregon Pesticide Rule and waste designation for sediments adjacent to the Arkema facility. The issue is summarized and LSS' dispute position is presented in the following sections.

1. Background and Summary

The following section is excerpted from EPA's January 10, 2014 letter (Exhibit 8; EPA 2014).

> Comment 20 – Oregon Pesticide Residue Rule and Waste Designation
> This comment was discussed in the November 14th meeting. LSS provided the following summary in their November 22nd letter:
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> *LSS discussed the November 20, 2008 letter from DEQ regarding the Oregon Pesticide Residue Rule. Specifically, part 2 of the letter states the following:*

"If the dredged material disposal is not subject to a CWA section 404 or MPRSA section 103 permit, RCRA Subtitle C requirements may apply. For example, if dredged material were to be disposed in an upland facility with no runoff or return flow to waters of the United States, this material would not be under the jurisdiction of the CWA or MPRSA and therefore would be subject to RCRA Subtitle C if it meets the definition of a RCRA hazardous waste."

Based on this information, LSS believes sediments at the Arkema site are not a hazardous waste based solely on DDT concentrations under RCRA regulations. EPA indicated that it was helpful to know LSS' position on this issue, but a discussion with EPA's RCRA specialists would be necessary to resolve this issue.

EPA Response:
EPA previously provided clarification to the LSS response for Comment 20 on September 18, 2013. The EPA response providing the clarification was as follows:

"The referenced November 20, 2008 ODEQ [Oregon Department of Environmental Quality] letter, which LSS attached to their March 28th response, states that sediments are exempt from RCRA requirements under certain circumstances and that any state hazardous waste requirements are subject to the same exemption. According to the letter, if a dredging operation is subject to a CWA [Clean Water Act] permit, then the exemption applies. If not, the exemption does not apply. EPA consulted DEQ regarding this comment response. DEQ interprets the RCRA Subtitle C requirements referenced in the DEQ 2008 letter to include state only hazardous wastes (e.g., pesticide residue). Consequently, sediment off the Arkema property that contains a pesticide residue is not exempt from the Oregon Pesticide Rule if it is managed upland. LSS is correct that the Oregon Pesticide Rule does not identify concentration threshold triggers for DDT and isomers (DDx). However, it is understood that sediment adjacent to Arkema contains DDT- manufacturing waste (i.e., pesticide residue). DEQ interprets this to mean that sediment adjacent to the site contains a pesticide residue if the DDx concentrations are above anthropogenic background levels in upstream sediment. Therefore, per our original comment and DEQ's position, the material will likely have to be managed at a Subtitle C permitted facility as a State of Oregon Hazardous Waste (OAR 340-109-0010). The cost implications of this waste characterization and disposal must be considered for the various alternatives in the EE/CA."

In its November 14th letter, LSS acknowledged that RCRA would be a requirement but that dredged sediment was not anticipated to contain RCRA hazardous waste. This position is inconsistent with the data on the sediment adjacent to Arkema's facility, particularly between the docks. There is pesticide residue above upstream anthropogenic levels. Accordingly, LSS' response does not address or acknowledge whether dredged sediment evaluated for upland disposal would be evaluated and costed as a State of Oregon Hazardous Waste as indicated by the Oregon Pesticide Rule.

LSS must comply with the DEQ position that dredged sediment disposed in an upland area is subject to management as a State of Oregon Hazardous Waste (OAR 340-109-0010). The cost implications of this waste characterization and disposal must be considered for the various alternatives in the EE/CA that involved disposal of dredged material in an upland area.

2. LSS Dispute Position

LSS disputes EPA's interpretation of the November 20, 2008 letter from DEQ regarding the State application of the Hazardous Waste Management Requirements (HWIR) Rule, the State of Oregon Pesticide Residue Rule, and the need to manage the dredged material as a State of Oregon only hazardous waste. The November 20, 2008 DEQ letter states that under this rule, dredged material should generally be managed in one of the following two ways (Exhibit 11; DEQ 2010):

> *" 1) If the dredged material is subject to a permit that has been issued under Clean Water Act (CWA) section 404 or the Marine Protection, Research and Sanctuaries Act (MPRSA) section 103, Resource Conservation and Recovery Act (RCRA) Subtitle C requirements do not apply. The dredged material is not hazardous waste.*
>
> *2) If the dredged material disposal is not subject to a CWA section 404 or MPRSA section 103 permit, RCRA Subtitle C requirements may apply. For example, if dredged material were to be disposed in an upland facility with no runoff or return flow to waters of the United States, this material would not be under the jurisdiction of the CWA or MPRSA and therefore would be subject to RCRA Subtitle C if it meets the definition of a RCRA hazardous waste."*

EPA stated the following in its January 10, 2014 letter to LSS (Exhibit 8; EPA 2014):

> *"According to the letter, if a dredging operation is subject to a CWA [Clean Water Act] permit, then the exemption applies.* ***If not, the exemption does not apply.*** *EPA consulted DEQ regarding this comment response. DEQ interprets the RCRA Subtitle C requirements referenced in the DEQ 2008 letter to include state only hazardous wastes (e.g., pesticide residue). Consequently, sediment off the Arkema property that contains a pesticide residue is not exempt from the Oregon Pesticide Rule if it is managed upland."*

EPA's statement is an incorrect recitation of the November 20, 2008 letter from DEQ. DEQ's letter does not say that "***If not, the exemption does not apply."*** EPA's current position is also inconsistent with the discussions during the November 14, 2013 meeting between LSS, EPA, and DEQ representatives. LSS agrees that if case 1 applies (dredging operations subject to a CWA permit), it is exempt from the RCRA Subtitle C requirements. However, if case 2 applies (dredging operations not subject to a CWA permit), the waste (sediment) "***would be subject to RCRA Subtitle C requirements if it meets the definition of a RCRA hazardous waste***". Therefore, per DEQ's letter, the sediment will be characterized in accordance with RCRA requirements. DEQ's letter clearly states that *"DEQ adopted the federal Hazardous Remediation Waste Management Requirements (HWIR-media rule) in October 2003. The rule excludes dredged*

sediments from the definition of hazardous waste, under certain circumstances. ***DEQ will also apply this exclusion to State-only hazardous wastes.*** *" **(emphasis added)*** The Oregon State Pesticide Rule is a state-only rule not a federal /RCRA rule and, therefore, has no bearing on characterizing the sediments/wastes under RCRA.

LSS noted in the March 28, 2013 response to comments that a robust waste characterization sampling program will be presented as part of the remedy design once a final remedy has been selected by EPA (Exhibit 3; LSS 2013a). This waste characterization program will include all necessary testing to determine if the sediment is a RCRA characteristic hazardous waste.

C. Monitored Natural Recovery and Nonaqueous-Phase Liquids

LSS disputes Comments 26, 37, 38, 39, 40, 43, 44, 45, 46, and 47 related to the use of monitored natural recovery (MNR) in the EE/CA alternatives and references to the presence of nonaqueous-phase liquids (NAPLs) in sediments offshore of the Arkema site. These issues are summarized and LSS' dispute position is presented in the following sections.

1. Background and Summary

The following section is excerpted from EPA's January 10, 2014 letter (Exhibit 8; EPA 2014).

> Comments 26, 37, 38, 39, 40, 43, 44, 45, 46, and 47 – MNR/NAPL
> These comments were discussed in the November 14th meeting. LSS provided the following summary in their November 22nd letter:
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> *LSS and EPA broadly discussed technical comments concerning MNR and NAPL. This discussion resulted in a better understanding of each party's respective position that will facilitate development of a path forward for revision of the EE/CA report. It was agreed that further discussion will be necessary to develop this path. The discussion is summarized below.*
>
> *LSS presented several lines of evidence to support its position that natural recovery is occurring at the Arkema site. EPA agreed that natural recovery is likely occurring, and clarified that its primary concerns regard the rate at which natural recovery may be occurring and the associated effectiveness of MNR as a primary remedial technology. LSS clarified that none of the EE/CA alternatives rely on MNR as a primary remedial approach. Further, LSS acknowledged MNR is not appropriate for the higher DDx concentration area located between Docks 1 and 2. For this area of sediment containing the highest concentrations of COCs, LSS has proposed to use active remedial technologies - varying degrees of removal and engineered containment. LSS clarified that it has proposed to use MNR to address peripheral depositional areas where COC concentrations are substantially lower.*
>
> *LSS and EPA acknowledged a difference of opinion on the definition of NAPL (traces of petroleum hydrocarbon or organic sheens vs. site related manufacturing process residues present as a NAPL) and its presence in sediments adjacent to the Arkema site. LSS acknowledged the dissolved phase MCB in sediment porewater and that there is a*

"stranded wedge" of contaminated groundwater between the groundwater barrier wall and sediments at the site. LSS stated that there is no evidence of a NAPL in sediments, but does acknowledge that there is NAPL in the upland portion of the Site in the former Acid Plant Area; however it is immobile and becomes discontinuous and thins to a fraction of an inch near the top of the bank.

EPA clarified that its focus, with respect to remedy protectiveness, is the potential for transport of residual contamination left at depth. For instance, the feasibility evaluation of engineered capping must consider potential for flux of contamination in groundwater. LSS acknowledged this concern and noted flux of COIs present in sediments would be further evaluated in remedy design. LSS noted that none of the alternatives in the draft EE/CA report precluded the use of active cap amendments such as granular carbon or organoclay.

EPA Response:
Although monitored natural recovery (MNR) is only minimally relied upon in the draft EE/CA alternatives for the area between Dock 1 and Dock 2, it is relied upon exclusively for the downstream DDx islands and the area immediately downstream of Dock 2 for alternatives 2(i), 3(i) and 4(i) and partially for alternatives 2(r), 3(r) and 4(r). Reliance on MNR in the removal action area (RAA) downstream of Dock 2 continues to present a concern for EPA. Based on information from the Portland Harbor FS (e.g., draft FS Figure 2.1-2), the area downstream of the docks is generally neutral to erosional with respect to deposition rate (most of the deposition is taking place off shore and upstream of the higher concentration DDx area between the Dock 1 and Dock 2). The Lower Willamette Group (LWG) classified the area downstream of the dock area as category 2 (e.g., draft FS Figure 6.2-2) with respect to MNR (recovery less certain). Based on the draft FS information, it appears that MNR may only be favorable in a thin area along the navigation channel upstream of Dock 1. In addition, due to the scarcity of other constituent of interest (COI) data (such as PCDD/F) in the downstream portion of the RAA, one cannot limit the evaluation of the MNR potential and residual risk solely to the distribution of DDx. Given the existing information from the draft FS and lack of chemical data on all COIs, there is no information indicating that it would be protective of human health or the environment to select MNR as part of the remedy for the Arkema RAA; therefore the revised EE/CA report must remove MNR from consideration in the EE/CA alternatives with the possible exception of the DDx island(s) located offshore and upstream of Dock 1.

EPA agrees that a difference of opinion exists with LSS as to whether NAPL is present off shore of the Arkema site, irrespective of its source. However, EPA acknowledges that LSS has agreed to address our concerns regarding the presence of NAPL by including active cap amendments in the remedial design.

2. LSS Dispute Position Regarding MNR

LSS disputes EPA's request to remove MNR from consideration in the EE/CA alternatives.

The evaluation presented by EPA in its January 10, 2014 letter does not support the removal of MNR from consideration in the EE/CA alternatives:

- **Bathymetric Change**–EPA referenced Figure 2.1-2 of the Portland Harbor FS report in its response, which presents the bathymetric change from 2003-2009 (Exhibit 12; Anchor QEA et al. 2012). However, this figure does not include bathymetric data for the shallow near-shore portion of the Arkema RAA, which includes portions of the DDx islands downstream of Dock 2. The portions of the DDx islands that are covered by the bathymetric survey vary from slightly erosional to slightly depositional. The viability of natural recovery cannot be assessed based on the inconclusive and/or incomplete information presented in Figure 2.1-2.
- **Classification of MNR Effectiveness**–EPA stated that *"The Lower Willamette Group (LWG) classified the area downstream of the dock area as category 2 (e.g., draft FS Figure 6.2-2) with respect to MNR* ***(recovery less certain)****" (emphasis added).* This is a mischaracterization of the definition of category 2 MNR effectiveness provided on page 6-23 of the Portland Harbor FS (Exhibit 12): *"Category 2 was assigned to areas where a given LOE [line of evidence] suggests that natural recovery will likely occur, but the degree of effectiveness is less certain."* The uncertainty in category 2 is related to either a lack of data or no data at the scale needed to determine whether MNR is occurring.
- **Scarcity of Other COI Data**–EPA stated in their response that there was a scarcity of other COI data (such as PCDD/Fs) in the downstream portion of the RAA. LSS does not agree. The DDx islands downstream of Dock 2 include data for 20 samples that were analyzed for PCDD/Fs, which is a robust data set for an area that is less than one acre in size.

In contrast to EPA's evaluation, natural recovery in river mile 7-8 was well documented in the Portland Harbor FS by multiple lines of evidence. The results of the evaluation indicate that "*natural recovery would be expected to be effective"* in river mile 7-8. Page 6-30 of the Portland Harbor FS states the following (Exhibit 12; Anchor QEA et al. 2012):

> ***"RMs* [*7 to 8*]***: Overall, the combined LOEs suggest that natural recovery is expected to be effective in this river mile, as most of this river mile is characterized as average recovery Category 3 (Figure 6.2-21e). This assessment is based on: 1) relatively high sedimentation rates; 2) surface sediment concentrations being lower than those at depth in many parts of this river mile; 3) prevalence of fine sediment; and 4) relatively short half-lives predicted by the long-term sediment transport simulation. One exception is the Willbridge Terminal area within AOPC 16, where the effectiveness of natural recovery is more uncertain given the presence of an FMD area that is co-located with areas of observed net erosion (or elevation change due to maintenance dredging) near the terminal docks and sediment cores with higher concentrations at the surface relative to the subsurface. Observed bed elevation decreases in this area during the 2002 to 2009 period was likely due to a combination of maintenance dredging and/or propwash disturbances associated with vessel traffic. However, despite these limited areas that may contribute less to natural recovery, the weight of evidence for this river mile as a whole*

> *(i.e., on a 1-mile average basis) indicates that natural recovery would be expected to be effective, and* ***it was therefore characterized as Category 3****."*[1]

In addition, natural recovery in the Lower Willamette River, including AOPC 14, has been demonstrated in coupled sediment recovery and dynamic food web model analyses conducted by LSS (Exhibit 13; LSS 2013d) and the LWG (Exhibit 14; LWG 2013). These analyses assessed the validity of the combined sediment recovery and food web model to determine the mean total PCB concentration in fish tissue in AOPC 14 and the rest of the Portland Harbor site. This study was based on four rounds of sampling and analysis of small mouth bass tissue from 2002 to 2012. The model accurately depicted the decline in mean PCB fish tissue concentrations during 2002-2012, which demonstrates that natural recovery is occurring in AOPC 14 as well as other areas of the Portland Harbor site.

Additional lines of evidence for natural recovery in the Arkema RAA downstream of Dock 2 include the following:

- **Fine-grained surface sediment** – Figure 2.1-3 of the Portland Harbor FS report presents percent fines in surface sediment at the site (Exhibit 12; Anchor QEA et al. 2012). Based on this figure, the Arkema RAA consists primarily of fine grained sediments (60-100%). This figure is consistent with field observations from sediment sampling throughout the RAA, including in the vicinity of the DDx islands downstream of Dock 2. Fine-grained sediments such as silts and clays tend to dominate in relatively low-energy (depositional) environments (Anchor QEA et al. 2012). This indicates natural recovery is actively occurring in the Arkema RAA.

- **Higher concentrations in subsurface sediment** – The DDx islands downstream of Dock 2 generally have the highest DDx concentrations 4 to 8 ft below mudline (see Figure 3-1 of the *Final Removal Action Area Characterization Report* [Final RAAC Report]; Exhibit 15; Integral and ARCADIS 2011). Historical discharge of manufacturing process residues directly to the river ended in the late 1940s. No filling activities have been documented in this part of the river, so the deposition of cleaner sediment must be from natural depositional processes. This demonstrates that natural recovery has been actively occurring over the long-term (i.e., 65 years).

- **Historical dredging activities** – Historical maintenance dredging has periodically been conducted adjacent to the docks at the Arkema facility. The need for periodic dredging demonstrates that the area in the vicinity of the docks is a net depositional environment. In addition, the historical dredged areas were on the river side of the docks, which would be a higher energy environment than the area downstream of the docks where the DDx islands are located.

[1] The LWG used a weight-of-evidence evaluation of MNR effectiveness that included net sedimentation rate, surface sediment grain size, surface to subsurface contaminant concentration ratios, maintenance dredging/prop wash activity, shoreline wave action, and model-predicted long-term recovery rates. Category 3 was assigned to areas where a given line of evidence indicates MNR would be effective.

- **No future dredging activities** – The area downstream of Dock 2 will not require maintenance dredging in the future since the depth to bedrock is too shallow for river-dependent use (i.e., to facilitate large vessels). This makes the area favorable for natural recovery.

- **No future propeller scour** – Propeller scour is unlikely for the area downstream of Dock 2 since the shallow water depths will not facilitate large vessels, which makes the area favorable for natural recovery.

In summary, based on the multiple lines of evidence presented above for the Arkema RAA and surrounding areas, natural recovery is actively occurring. In addition, LSS notes that EPA acknowledged that MNR may be favorable in a thin area along the navigation channel upstream of Dock 1. Therefore, MNR is a viable option for the Arkema RAA and should continue to be allowed as an element of the EE/CA alternatives.

3. LSS Dispute Position Regarding NAPL

LSS disputes EPA's inference that there is NAPL present in the sediments offshore of the Arkema site within the RAA. There is no technical, scientific, or factual basis with which to draw this conclusion. Based on discussions with EPA at the November 14, 2013 meeting, LSS believed that it had a resolution of this issue with EPA agreeing to focus on COIs that remain post-removal action, and their potential mobility in designing a cap. LSS captured this agreement in our meeting summary sent to EPA by letter dated November 22, 2013 (Exhibit 5):

> *"EPA clarified that its focus, with respect to remedy protectiveness, is the potential for transport of residual contamination left at depth. For instance, the feasibility evaluation of engineered capping must consider potential for flux of contamination in groundwater. LSS acknowledged this concern and noted flux of COIs present in sediments would be further evaluated in remedy design."*

EPA's most recent position statement below retains the term NAPL in the last sentence. Per LSS understanding, this term was to be replaced with "residual contamination" based upon the clarifications reached during the November 14 meeting.

> *"EPA agrees that a difference of opinion exists with LSS as to whether NAPL is present off shore of the Arkema site, irrespective of its source. However, EPA acknowledges that LSS has agreed to address our concerns regarding* ***the presence of NAPL*** *by including active cap amendments in the remedial design." (**emphasis added**)*

As previously discussed at the November 14, 2013 meeting, there is no documented presence of NAPLs in sediments off the Arkema site. Since 2002, there have been more than 60 boreholes advanced and continuously sampled from the mudline surface to bedrock or gravel refusal in sediment adjacent to the Arkema site, and NAPL has never been identified. In 2002-2003, a total of 22 boreholes were advanced between or immediately adjacent to Docks 1 and 2, which is adjacent to the portion of the Arkema site where historical DDT manufacturing occurred. No

NAPLs were observed in sediment adjacent to the Arkema site during the 2002-2003 investigation. Sheens[2] were observed in selected boreholes, which is consistent with a typical navigable river in an area that has been industrialized for more than 100 years.

The most recent and comprehensive sediment investigation adjacent to the Arkema site occurred in 2009 (EE/CA RAA characterization). Thirty-six boreholes were advanced to bedrock using a sonic drill rig. Sediment samples from each borehole were collected continuously from mudline to bedrock or gravel refusal, visual observations were made, and photographs were taken of each sample interval. Consistent with the earlier investigations, sheens were observed at selected locations offshore of Arkema. This observation is consistent with a typical navigable river in an area that has been industrialized for more than 100 years, and for a location that is immediately downstream of a bulk petroleum fuel terminal and other potential sources. No NAPL was observed, even immediately adjacent to the former DDT manufacturing area. LSS notes that EPA representatives were present during the 2009 field investigation and visually observed hundreds of sediment samples and collected numerous split samples for laboratory analysis. The detailed *Field Oversight Report for 2009 Arkema EE/CA Investigation*, prepared by EPA's contractor CDM, did not identify the presence of NAPL in any of the 36 boreholes advanced as part of the EE/CA investigation (Exhibit 16; CDM 2010).

For many years the shoreline adjacent to the Arkema Site was used as a staging area for logs (see 1941 oblique aerial photo in Exhibit 17). Sheens due to organic material deposited in the sediment from these log rafts have been documented. In addition, the Arkema site is located immediately downstream of a bulk petroleum fuel terminal and other potential sources. Isolated sheens related to the industrial, commercial, and recreational use of the river are not evidence of NAPL related to the Arkema Site.

EPA's June 25, 2013 technical memorandum entitled "Arkema Offshore NAPL Evaluation" (Exhibit 18; CDM Smith 2013) was prepared 4 years after the EE/CA Characterization investigation and 1½ years after the Final RAAC Report was submitted to EPA (Exhibit 15). There was no documented evidence of NAPL during the EE/CA investigation and, as a result, there was no discussion of NAPL in the Final RAAC Report (Integral and ARCADIS 2011). EPA is now using its subsequent analysis in the 2013 Arkema Offshore NAPL Evaluation memo as evidence of NAPL in the sediments offshore of the Arkema Site. EPA has based its finding of NAPL presence largely on a 1 percent solubility rule of thumb. The 1 percent solubility rule of thumb is not a definitive finding of NAPL; it is more typically used to screen initial sample data for a site to identify whether a site might require further assessment as to a NAPL source. Furthermore, EPA appears to have incorrectly applied the 1 percent rule-of-thumb to DDT (a material that is a solid at room temperature). This is incorrect and problematic on at least two levels. First, the NAPL solubility rules apply to liquids, not solids (e.g., see Cohen and Mercer 1990; EPA 1992). Secondly, the sediment pore water DDT concentration data used in EPA's

[2] The sheens observed on the sediment samples could have either been natural organic sheens or petroleum hydrocarbon sheens. The sediment samples with sheens were not analyzed for total petroleum hydrocarbons since that is not a COI at the Arkema site. However, several of the sediment samples with sheens were analyzed for volatile organic compounds and were either non-detect or had low-level detections of monochlorobenzene (MCB), demonstrating that the sheens in these samples were not related to DDT manufacturing at the Arkema site.

evaluation (Integral 2003) were collected using Geoprobe® sampling equipment. Groundwater sampling with Geoprobe® equipment is known to entrain high concentrations of suspended solids, which provides a high bias to sample results for pesticides, metals, and other hydrophobic contaminants. EPA states the following on page 5 of the Arkema Offshore NAPL Evaluation memo (Exhibit 18; CDM Smith 2013):

> "Groundwater concentrations of chlorobenzene and 4,4'-DDT also support the visual *documentation of NAPL. Chlorobenzene concentrations greater than 1% solubility were identified in three TZW samples and seven borehole groundwater samples. Elevated chlorobenzene results from the 2003 Phase II sediment investigation were described as being the result of, "DNAPL fluids likely migrated along more permeable sand beds within the finer-grained and less permeable sediments that slope to the southeast and generally emulated the slope of the basalt surface in the near shore area" (Integral, 2003).* ***4,4'-DDT concentrations greater than 1% solubility were identified in four TZW samples and 14 borehole groundwater samples****, 11 of which were above 100% solubility concentrations.*
>
> *Based on the primary line of evidence (visual observation), and secondary lines of evidence (sheen/odor with accompanying elevated OVM readings and elevated TZW and groundwater contaminant concentrations in excess of 1% solubility), NAPL appears to be present in the in-water sediment adjacent to the Arkema site." (****emphasis added****)*

In summary, 1) there is no correlation between areas of observed sheens and high MCB concentrations; 2) the exceedance of a 1 percent rule of thumb for chemicals in sediment is inapplicable to DDT which is a solid, not a liquid; 3) reliance upon groundwater DDT data collected using Geoprobe® sampling equipment is unreliable because it is known to provide a high bias to results for hydrophobic compounds (i.e., DDT); and 4) sporadically observed sheens are likely to be organic sheens (i.e., from the breakdown of natural organic matter, such as wood debris) or from petroleum sources located in the nearby, upstream vicinity of the site. Based on the application of sound technical principals to the evidence, LSS must insist that all references to NAPL in the sediments offshore of the Arkema Site be stricken from the administrative record.

D. Other Sources of COIs

LSS disputes issues related to other sources of COIs that were presented in Comments 61, 92, 93, 94, 95, 96, 97, and 98. The issue is summarized and LSS' dispute position is presented in the following sections.

1. Background and Summary

The following section is excerpted from EPA's January 10, 2014 letter (Exhibit 8; EPA 2014).

> Comments 61, 92 through 98 – Other Sources of COIs
> These comments were discussed in the November 14th meeting. LSS provided the following summary in their November 22nd letter:

LSS feels strongly that a discussion of other sources of COIs needs to be included in the EE/CA documents. EPA wants to keep the EE/CA documents focused and is not concerned with the source of the COIs. LSS agreed to keep the discussion of other sources of COIs concise so that the remedial options are the focus of the documents, and EPA agreed to consider some language acknowledging other sources of COIs.

EPA Response:
EPA maintains that source apportionment is not relevant to the EE/CA and should not be included. The EE/CA is not a document for identifying and apportioning liability. Additionally, EPA does not agree with all of LSS' statements regarding sources. In as much as the Lower Willamette River is highly industrialized, multiple sources for some contaminants are likely. Purely historical sources of contamination now found within the RAA is not specifically relevant to discuss as the decision that action is required has been made. Where ongoing releases of these contaminants may affect permanence of a remedy (in this case the early action), those sources need to be considered during analysis of recontamination and potential further control by DEQ. If DDx in upstream sediments could be mobilized and deposited in the RAA post-action, the importance of this DDx is limited to how it might affect implementation of the early action. Thus, it is appropriate for the EE/CA to include general language that acknowledges the likelihood of upstream sources of some COIs, but EPA cannot accept language that seeks to assign releases to specific non-Arkema activities. As we have stated previously, we also do not agree with statements that conclude Arkema is not a source of any of the COIs found within the RAA. For example, a statement such as "some PCDD/F are present in west bank sediments upstream of Arkema property and may not be associated with Arkema activities" would be acceptable. However, a statement such as "PCDD/F in sediments offshore of Lot 1 are not associated with historical Arkema activities and likely were released from the Rhone-Poulenc property" is not acceptable both due to the reasons stated above and because the statement is contrary to existing information. There is a strong furan signal in sediments from downstream of the salt dock to the railroad bridge. This signal indicates that polychlorinated dibenzofuran (PCDF), likely related to historical Arkema operations, is a dominant component of PCDD/F as far downstream as the EE/CA analyses extend.

2. LSS Dispute Position

LSS disputes these comments because they are inconsistent with the Arkema Administrative Order on Consent (AOC; Exhibit 19; EPA 2005) and the 2011 Opalski Decision (Exhibit 20; EPA 2011). Pursuant to AOC Paragraph 76, "Nothing in this Order precludes the United States or Respondent from asserting any claims, causes of action, or demands against any persons not parties to this Order for indemnification, contribution, or cost recovery." In the discussion of the sources of dioxins/furans, the Opalski Decision dated August 31, 2011 states, "It is expected that the EE/CA report will include a summary of supportable source attribution information." In response to Comments 61, 92, 93, 94, 95, 96, 97, and 98, EPA seeks to delete technical information provided by LSS that identifies other sources.

EPA's comments are inappropriate, unsupported by the facts, and harm LSS' rights under AOC Paragraph 76 to pursue indemnification, contribution, and cost recovery. This is also in direct contradiction to the Opalski Decision. LSS has provided firm technical bases on the identification of additional sources. That information has been summarily dismissed by EPA without technical justification. EPA's unsupported comments on source attribution must be retracted to prevent prejudice against Arkema's rights under the Arkema AOC and the 2011 Opalski Decision.

E. Capping as the Primary Remedial Approach

LSS disputes Comments 73, 101, and 103 related to capping as the primary remedial approach. The issue is summarized and LSS' dispute position is presented in the following sections.

1. Background and Summary

The following section is excerpted from EPA's January 10, 2014 letter (Exhibit 8; EPA 2014).

> Comments 73, 101, and 103 – Capping as the Primary Remedial Approach
> These comments were discussed in the December 12th meeting. LSS provided the following summary in their December 18th letter:
>
> *LSS and EPA agreed that the alternatives presented in the draft EE/CA report represent a range of sediment removal. EPA indicated that it was acceptable to evaluate the presented range of alternatives given the draft EE/CA includes, for comparison, an alternative with a large emphasis on removal (i.e. Alternative 4r). EPA further indicated that an engineered cap must consider the potential for contaminant flux, which may require inclusion of cap amendments. Based on the November 14th meeting, LSS has acknowledged this concern and indicated that flux of COIs present in sediments would be further evaluated in remedy design. For costing purposes, the EE/CA assumes inclusion of reactive cap amendments.*
>
> **EPA Response:**
> EPA concurs that LSS may retain alternatives in the EE/CA that include dredging with an engineered cap. Given EPA's requirement that MNR be excluded from consideration in the area downstream of Dock 2 (ref Comments 26, 37, 38, 39, 40, 43, 44, 45, 46, and 47 – MNR/NAPL discussion above), the range of dredging options may need to be expanded in the revised EE/CA report.

2. LSS Dispute Position

LSS disputes EPA's request to remove MNR from consideration in the EE/CA alternatives. Please see the section above entitled "Monitored Natural Recovery and Nonaqueous-Phase Liquids" for the LSS dispute position on the MNR issue.

F. Remedy Implementation and Monitoring

LSS disputes Comments 106, 107, 108, 109, 111, and 112 related to remedy implementation and monitoring. The issue is summarized and the LSS dispute position is presented in the following sections.

1. Background and Summary

The following section is excerpted from EPA's January 10, 2014 letter (Exhibit 8).

> Comments 106, 107, 108, 109, 111, and 112 – Remedy Implementation and Monitoring
> These comments were discussed in the December 12th meeting. LSS provided the following summary in their December 18th letter:
>
> *LSS and EPA agreed to defer further evaluation of engineered controls for dredge residuals management to the design phase of the early action. Design-level evaluation of a range of available technologies (including rigid containment), BMPs and other management strategies (e.g. thin layer placement) will be conducted in conjunction with the design of a water quality monitoring program, including the selection of appropriate water quality performance standards.*
>
> **EPA Response:**
> EPA agrees to address specifics of managing releases and/or residuals during dredging in the design phase; however, the revised EE/CA document must acknowledge the full menu of engineered controls technologies which will be evaluated. A technology that must be evaluated is rigid containment which is currently characterized by LSS as not technically practicable in the draft EE/CA report.

2. LSS Dispute Position

LSS disputes the evaluation of rigid containment through the entire design process if it is determined that it is not a viable technology for the Arkema RAA. LSS has agreed to conduct a design-level evaluation of available engineering controls for dredge residuals management. It is anticipated that an evaluation of available technologies, including rigid containment, will be conducted in conjunction with the development of construction performance standards and a construction water quality monitoring program. The objective will be to develop a construction design package that includes a holistic, efficient strategy for management of releases and/or residuals. However, if the evaluation concludes rigid containment is not a viable component of this strategy, a detailed analysis of rigid containment will not be carried through the remainder of the design process.

G. Agreements Reached between LWG and EPA on Harbor-Wide Issues

LSS disputes the process for disputing agreements reached between LWG and EPA on harbor-wide issues that was described in EPA's January 10, 2014 letter. The issue is summarized and LSS' dispute position is presented in the following sections.

1. Background and Summary

The following section is excerpted from EPA's January 10, 2014 letter (Exhibit 8; EPA 2014).

> Agreements Reached between LWG and EPA on Harbor-wide Issues
> In the closing to their November 22nd letter LSS provided the following statement:
>
> *One additional topic of discussion related to agreements reached between LWG and EPA on harbor-wide issues. LSS noted that it does not have control over the agreements made between LWG and EPA, so LSS needs to have the opportunity to dispute harbor-wide agreements and decisions such as final PRGs when these issues become memorialized in the harbor-wide process. EPA noted that LSS would have the opportunity to dispute the harbor-wide agreements and decisions outside of the LWG process, in accordance with the Arkema AOC for Removal Action.*
>
> **EPA Response:**
> Unfortunately, LSS misheard or misunderstood EPA's position. With regard to harbor-wide issues, LSS, through Arkema Inc., a party to the RI/FS AOC, must raise any concerns with harbor-wide issues through the dispute process under the RI/FS AOC. EPA cannot risk delay of finalizing the FS or developing the proposed plan by agreeing that RI/FS issues may be disputed outside of the RI/FS AOC. This position is fair and reasonable particularly given that Arkema or its agent is party to the RI/FS AOC. The harbor-wide issues will be discussed first with the LWG and in accordance with the terms of the RI/FS AOC would need to be disputed within 14 days of EPA's decision on any particular issue. Arkema must dispute such issue under the RI/FS AOC dispute timeframe or it waives its right to dispute the issue.

2. LSS Dispute Position

LSS must dispute EPA's position. The Arkema Removal Action is being conducted under Administrative Order of Consent (AOC) Docket No. CERCLA 10-2005-0191 that was entered into between EPA and Arkema Inc. (Exhibit 19). While there are technical issues that are currently considered "harbor-wide" as summarized at the beginning of this document, LSS cannot know how these deferred "harbor-wide place-holder" issues will impact final decisions for the removal action or EE/CA until 1) the issue has been resolved through the Portland Harbor RI/FS process, and 2) EPA has provided LSS, in writing, their interpretation of how the issue has been resolved, and how that resolution will be applied to the Arkema Removal Action. This latter element is important because until EPA clarifies how the decision through the Portland Harbor RI/FS process directly impacts the decisions made on the Removal Action, LSS cannot know whether there is a technical issue that needs to be resolved through informal or formal dispute or other means. Furthermore, Paragraph 22 (Section VIII. Work To Be Performed) of the Removal Action Order (Docket No. CERCLA 10-2005-0191) states,

> *"22. For all Work, EPA may approve, disapprove, require revisions to, or modify a deliverable in whole or in part.* ***EPA approvals, requested revisions, or disapprovals will be in writing****. If EPA requires revisions, Respondent shall submit a revised deliverable within 30 days of receipt of EPA's notification of the required revisions, unless otherwise noted in the SOW, and subject to Section XVI (Dispute Resolution) of this Order.*

> *Respondent shall implement the work as approved in writing by EPA in accordance with the schedule approved by EPA. Once approved, or approved with modifications, the work and the schedule, and any subsequent modifications, shall be incorporated into and become fully enforceable under this Order. (**Emphasis added**)"*

Accordingly, for LSS to understand and respond to the implications of EPA's position on the Removal Action for any issue resolved through the Portland Harbor RI/FS "harbor-wide" process (e.g., resolution of the harbor-wide place-holder comments), LSS must receive direction of such issues, in writing. Upon receipt of a written notice from EPA with specific action to be taken in the EE/CA, LSS can only then determine whether a dispute is necessary pursuant to respondent's rights under Section XVI (Dispute Resolution) of the Removal Action AOC.

With respect to EPA's comment—"EPA cannot risk delay of finalizing the FS or developing the proposed plan by agreeing that RI/FS issues may be disputed outside of the RI/FS AOC. This position is fair and reasonable particularly given that Arkema or its agent is party to the RI/FS AOC."—LSS is not taking the position that a dispute under the Removal Action Order would be used to alter the Portland Harbor RI/FS agreements under Portland Harbor RI/FS Order Docket No. CERCLA 10-2001-0240, but rather that any repercussions of such Portland Harbor RI/FS agreements on the Removal Action Order Docket No. CERCLA 10-2005-0191 would still be subject to the latter order and its dispute and resolution process. These are two separate orders with each having its own rights and processes. LSS is not waiving any dispute rights under either order.

LSS, agent for Arkema, cannot relinquish rights to dispute an EPA action pursuant to the Removal Action AOC. EPA cannot modify the requirements of the Removal Action AOC without a mutual agreement in writing (see Removal Action AOC XXVII; Exhibit 19). Please be advised that consent to modify is not given.

LSS looks forward to continuing to work with EPA in the formal negotiation period to explore reasonable options to resolve our differences. Please contact me at (610) 594-4430 if you have any questions pertaining to this letter and/or you wish to set up a meeting.

Sincerely,

Legacy Site Services LLC

J. Todd Slater
Assistant Vice President

Enclosures: Attachment 1: References Cited
Attachment 2: LPR Cost Details
Exhibits 1–20

cc: (electronic) Karen Traeger, LSS
Steve Parkinson, Joyce Ziker Parkinson
Lance Peterson, CDM Smith
Kristine Koch, EPA
Chip Humphrey, EPA

ATTACHMENT 1. REFERENCES

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Attachment 2 - EPA's Comments and LSS Dispute/Corrections/Responses on LPR Phase I EE/CA Cost Template for Use within Arkema EE/CA (Based on Exhibit 5-13 of EPA 540-R-00-002)

Key Questions to Ask When Reviewing a Remedial (Removal) Alternative Cost Estimate[1]	Arkema-Specific EE/CA EPA Comment	EPA's Comment on the LPR Cost Estimate (Appendix A of the LPR Phase I EE/CA) as Template Arkema EE/CA Cost Estimate		LSS Dispute Position and Proposed Resolution	
		Does LPR Cost Estimate Meet Basic Requirements as a Template for Arkema EE/CA? EPA's conclusion.	EPA Comments	LSS Dispute Position	LSS Proposed Resolution
1. Has a description of the alternative been provided?	14 and 33	No	No additional comment.	LSS disagrees with EPA comments. Descriptions of the four alternatives with summaries of process options are presented in Section 8.1.2, 8.1.3, 8.1.4, and 8.1.5 of the LPR Phase I EE/CA document. In addition, conceptual depictions of the process flows with detailed descriptions are provided on Figures 8-1 through 8-4. Key processes and technologies for each alternative (e.g., "Alternative A - Hydraulic Removal with Geotextile Tube Dewatering" - hydraulic removal and geotextile tube dewatering are key processes or technologies) are also identified for each alternative in Section 8. Furthermore, Table A-5 and Section 2 of Appendix A indicate which key processes (i.e., dewatering, transportation, and disposal) are included with each alternative and clearly distinguish where processes differ between alternatives (i.e., type of dewatering).	LSS will include this information in the revised EE/CA.
- Have the site, location, and project phase been noted?	14, 18 and 33	No	No additional comment.	LSS disagrees with EPA comments. The title of the document provides the site name, location, and phase—*Phase I Engineering Evaluation/Cost Analysis CERCLA Non-Time Critical Removal Action –Lower Passaic River Study Area*. This document title is also included in the upper right hand corner of almost every page of the document. A description of the site location and boundary is provided in Section 2.2.1 and shown in Figures 1-1, 1-2, and 1-3.	LSS will include this information in the revised EE/CA.
2. Have the capital, annual O&M, and periodic cost element structures been fully developed?					
- Have all applicable institutional controls cost elements been identified?	14 and 33	No	The LPR cost estimate does not include institutional controls. However this element may or may not be appropriate to include in the Arkema EE/CA cost estimate.	No institutional controls were identified in the LPR Phase I EE/CA; therefore, there are no cost elements for institutional controls at this site.	If institutional controls are required for the Arkema EE/CA, cost elements for these institutional controls will be included to the extent possible.
3. Have quantities for construction and O&M activities cost elements been estimated with sufficient backup?					
- Have calculation sheets, drawings, vendor information, or similar supporting data been included?	14, 18 and 33	No	No additional comment.	LSS disagrees with EPA comments. Note that the removal volume of 40,000 cubic yards for the LPR Phase I EE/CA was established in the AOC as 40,000 cy; therefore, no calculation was required to establish this volume. For all remaining quantities, Tables A-1 through A-4 are the calculation sheets, as they show columns for the estimated quantity, estimated unit price, and estimate total cost (i.e., the product of the first two columns) for each line item.	LSS will include this information in the revised EE/CA.

Key Questions to Ask When Reviewing a Remedial (Removal) Alternative Cost Estimate[1]	Arkema-Specific EE/CA EPA Comment	EPA's Comment on the LPR Cost Estimate (Appendix A of the LPR Phase I EE/CA) as Template Arkema EE/CA Cost Estimate		LSS Dispute Position and Proposed Resolution	
		Does LPR Cost Estimate Meet Basic Requirements as a Template for Arkema EE/CA? EPA's conclusion.	EPA Comments	LSS Dispute Position	LSS Proposed Resolution
4. Have unit costs for construction and O&M activities cost elements been estimated with sufficient backup?	14, 18 and 33	No	Sufficient backup for cost references were not identified.	LSS disagrees with EPA comments. Unit costs for construction and O&M activities are provided in Tables A-1 through A-4 of Appendix A. Detailed cost assumption information (i.e., dredge rates, volumes, solids content, unit costs) and the basis for such costs that could be used to verify construction and O&M costs is provided in Appendix A Sections 2 and 3. More detailed "design level" costs are deferred to project design.	LSS will follow this approach in the revised EE/CA.
- Is the source of cost data identified? Is the source appropriate?	14, 18 and 33	No	Vendor sources were minimally identified, and the absence of supporting documentation does not allow an independent review and/or verification of relative costs.	LSS disagrees with EPA comments. The source of the cost information varies and includes quotes from vendors, experience at similar projects, or standard FS assumptions (i.e., percentages). The cost data sources are identified in Appendix A Sections 2 and 3. More detailed "design level" costs are deferred to project design.	LSS will follow this approach in the revised EE/CA.
- Has subcontractor, if applicable, and prime contractor markups (i.e., overhead, profit) been added?	14, 18 and 33	No	No additional comment.	LSS disagrees with EPA comments. It is unclear how EPA made this determination as all costs are provided as total unit costs (i.e., no breakout of overhead and profit is provided). The degree of detail provided in the LPR Phase I EE/CA is typical of an EE/CA or FS document.	LSS will include this information in the revised EE/CA.
- Are quotations from suppliers and subcontractors documented in the backup?	14, 18 and 33	No	No additional comment.	Actual vendor quotes are not attached to this document; however, the degree of detail provided in the LPR Phase I EE/CA is typical of an EE/CA or FS document.	LSS will follow this approach in the revised EE/CA.
6. Have the applicable professional/ technical services costs been added?					
- If estimated on a percentage basis, are the values used appropriate, considering the total project cost and complexity?	14 and 33	No	The values indicated in Section 5.5 of the guidance[1] do not appear to have been used for estimating professional/technical services costs.	LSS disagrees with EPA comments. EPA states that "the values indicated in Section 5.5 of the guidance do not appear to have been used for estimating professional/technical services costs"; however, EPA does not identify to which professional/technical services they are referring. LSS notes that the costs appear to fall within the range in the EPA's Costing Guidance. For example, the indirect cost for Remedial Design was estimated at 10 percent, whereas the FS Costing Guidance provides a range of 6 to 20 percent depending on the scale of the project; so, the estimate provided falls within the range of the EPA's FS Costing Guidance. It should be further noted that Section 5.5 of the EPA's FS Costing Guidance states: *"For professional/technical services capital costs, Exhibit 5-8 shows rule-of-thumb percentages that can be used for project management, remedial design, and construction management as a percentage of total construction cost.* ***The percentages shown apply to the average remediation project and are provided as a guide. These values may be adjusted up for more complex projects or down for less complex projects, based on engineering judgment*** *(sic), which might consider actual cost data from similar projects." (****emphasis added****).*	LSS will provide this information as applicable in the revised EE/CA.
7. If applicable, have the costs associated with implementing and maintaining institutional controls been estimated?	14 and 33	No	The LPR cost estimate does not include institutional controls. However this element may or may not be appropriate to include in the Arkema EE/CA cost estimate.	No institutional controls were identified in the LPR Phase I EE/CA; therefore, the cost for implementing and maintaining institutional controls was not applicable to the LPR Phase I EE/CA site.	These costs will be included in the Arkema EE/CA, if applicable.

Key Questions to Ask When Reviewing a Remedial (Removal) Alternative Cost Estimate[1]	Arkema-Specific EE/CA EPA Comment	EPA's Comment on the LPR Cost Estimate (Appendix A of the LPR Phase I EE/CA) as Template Arkema EE/CA Cost Estimate		LSS Dispute Position and Proposed Resolution	
		Does LPR Cost Estimate Meet Basic Requirements as a Template for Arkema EE/CA? EPA's conclusion.	EPA Comments	LSS Dispute Position	LSS Proposed Resolution
8. Were guidelines followed for the present value analysis?	14, 15, 33 and 34	No	Present value analysis was not presented.	The LPR Phase I removal action was scheduled for completion in less than one year (52 weeks); therefore, a present value analysis was not applicable or required for the EE/CA cost estimate.	LSS has agreed to provide in the revised EE/CA a present value analysis for cost elements that extend beyond the first year of construction, if applicable.
- Is the period of present value analysis different than the anticipated project duration (i.e., time required for design, construction, O&M, and closeout)? If so, is explanation provided?	14, 15, 33 and 34	No	No additional comment.	The LPR Phase I removal action was scheduled for completion in less than one year (52 weeks); therefore, a present value analysis was not applicable or required for the EE/CA cost estimate.	LSS has agreed to provide in the revised EE/CA a present value analysis for cost elements that extend beyond the first year of construction, if applicable.
- Are all capital, annual O&M, and periodic costs included in the present value analysis?	14, 15, 33 and 35	No	No additional comment.	The LPR Phase I removal action was scheduled for completion in less than one year (52 weeks); therefore, a present value analysis was not applicable or required for the EE/CA cost estimate.	LSS has agreed to provide in the revised EE/CA a present value analysis for cost elements that extend beyond the first year of construction, if applicable.
–Is the discount rate used consistent with USEPA policy (e.g., 7%)? If not, is explanation provided?	14, 15, 33 and 36	No	No additional comment.	The LPR Phase I removal action was scheduled for completion in less than one year (52 weeks); therefore, a present value analysis was not applicable or required for the EE/CA cost estimate.	LSS has agreed to provide in the revised EE/CA a present value analysis for cost elements that extend beyond the first year of construction, if applicable.
- Is the same discount rate used across all of the alternatives analyzed?	14, 15, 33 and 37	No	No additional comment.	The LPR Phase I removal action was scheduled for completion in less than one year (52 weeks); therefore, a present value analysis was not applicable or required for the EE/CA cost estimate.	LSS has agreed to provide in the revised EE/CA a present value analysis for cost elements that extend beyond the first year of construction, if applicable.
–If discount factors were used, have the appropriate single-year or multi-year factors been applied, considering the period of analysis for each type of cost (i.e., capital, annual O&M, periodic)?	14, 15, 33 and 38	No	No additional comment.	The LPR Phase I removal action was scheduled for completion in less than one year (52 weeks); therefore, a present value analysis was not applicable or required for EE/CA cost estimate.	LSS has agreed to provide in the revised EE/CA a present value analysis for cost elements that extend beyond the first year of construction, if applicable.
9. Is there sufficient uncertainty for key factors to warrant a sensitivity analysis? If a sensitivity analysis was done, are results presented clearly in terms of total present value of the alternative?	14 and 33	No	The cost estimate did not present a sensitivity analysis, and a review of the alternative descriptions within the text of the Phase I EE/CA report was not performed to determine whether the scope of the alternatives warrant a sensitivity analysis.	EPA states that "The cost estimate did not present a sensitivity analysis, and a review of the alternative descriptions within the text of the Phase I EE/CA report was not performed to determine whether the scope of the alternatives warrant a sensitivity analysis." EPA's FS Costing Guidance states, "In the development of a remedial alternative cost estimate, a sensitivity analysis should be considered for those factors that have a relatively-high degree of uncertainty and that, with only a small change in their value, could significantly affect the overall cost of the alternative." Examples of elements, from the EPA FS Costing Guidance, that might require a sensitivity analysis include 1) a high degree of uncertainty with the estimated volume of contaminated sediment, 2) the potential failure of a remedy based on an unproven process or lack of performance history, 3) uncertainty in the project duration, or 4) uncertainty in the discount rate used in the present value calculation. Since none of these elements were applicable to the LPR Phase I EE/CA and there were no other factors that had a high degree of uncertainty, a sensitivity analysis was not required.	LSS will conduct a sensitivity analysis in the revised EE/CA, if applicable.

Notes:

1 - A Guide to Developing and Documenting Cost Estimates During the Feasibility Study, EPA 540-R-00-002 (July 2000)